Moving from Risks to Opportunities:
A Process to Manage New Product Transitions

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ABSTRACT

As a consequence of faster time-to-market and shorter product life cycles, companies today introduce new products more frequently. While new products can potentially bring tremendous value, they also pose enormous challenges as companies are most vulnerable during new product transitions. Due to the high stakes of new product transitions, planning and execution cannot be overemphasized. Nevertheless, our discussions with product transition teams suggested that a recurring handicap during transitions was the lack of a formal process to guide managerial decisions. This work develops a process to facilitate decision making during new product transitions. The proposed process analyzes the risks impacting a transition, identifies a set of factors across departments tracking those risks, monitors the evolution of these factors over time, and develops a playbook mapping scenarios of risks and responses. Our studies show that the transition process helps level expectations across the organization, lessens the chance and impact of unanticipated outcomes, and helps synchronize responses among different departments.

Keywords: Product transitions, dual-product rollovers, transition risks, primary strategies, contingency strategies, prevention strategies, mitigation strategies, transition playbook

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† Corresponding author. We thank Mary Murphy-Hoye and many others at Intel Corporation for their valuable and constructive comments on this research; and Nihat Altintas, Laura Black, Robert Carlson, Don Greer, Warren Hausman, and Rogelio Oliva for their comments on a previous version of this paper. We acknowledge the research assistance of Paresh Rajwat. We also thank Hau Lee for his insights and suggestions in the early stages of this work.

"[The process] immersed us in the data surrounding our new product transition and enabled us to become more familiar with the key inhibitors and drivers of the product ramp. It directly impacted the way we set the forecast range and helped us put a framework around the way we forecast new products."

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Introduction

As a result of faster time to market and shorter product life cycles, companies today face more frequent product transitions (i.e., simultaneous phase-in and phase-out of two generations of products) and consequently the potential rewards and challenges associated with them. Several studies show that the majority of new products fail in the marketplace[1] for many different reasons, and both academics and practitioners identify strategies capable of improving the chances of success of new products.[2] With a few notable exceptions[3], these studies focus on the success of a single product. However, product transitions can fail even when a new product meets all requirements for success. Consider for example, the case of products X and Y, two consecutive generations of high volume microprocessors that we observed at Intel Corporation, the major U.S. semiconductor manufacturer:

Intel originally designed product X as a transitional product that would enable a stronger performance trajectory than the previous platform. While X itself performed only slightly better than the previous generation upon launch, its design allowed steady performance gains per a wide array of computing benchmarks. The follow-up product Y would benefit significantly from platform cost reduction while also offering strong performance, thus enabling more competitively priced systems. Intel planned to move a substantial portion of the market to X and then complete the transition with the introduction of Y.

With capacity in place to support a moderately strong ramp, Intel decided to introduce X. The product, however, did not transition well. Early production resulted in excess inventory. Product X's failure to meet customers' needs and inability to usurp sales from its predecessor extended the life of the prior product. Due to unanticipated demand and lack of production capacity (some of which had been allocated to X), the prior product was in short supply for some time, with production managers working heroically to meet demand. Ultimately, short supply of the previous generation enabled competitors to increase unit sales.

Intel quickly realized that there were issues with X's components and pricing strategy. Several measures, including product rebates, were employed to improve sales, but the product continued to languish in the market. As the introduction of Y approached, the

company introduced an ambitious marketing campaign aimed at spurring sales and regaining market share. The campaign accelerated the product roadmap to higher performance and reduced overall pricing. The launch of Y quickly demonstrated that the marketing efforts were working. But instead of kick-starting the transition, the campaign overtook it with tremendous force. Demand for Y ramped up at a surprising record pace. Because of the record demand and challenges producing the product in high volume, exacerbated by the long throughput time of microprocessors (about 13 weeks), Intel faced significant supply shortages for some SKUs in the Y family. Once again, production managers struggled to meet customer demand. After several months, Intel balanced demand and supply for the transition and it eventually regained the market share that it had previously lost.

The interplay between two consecutive generations exemplified above constitutes a common and costly problem during product transitions. While product Y met all the requirements for a successful introduction, strategic decisions – encompassing marketing, operations, and product deployment – developed in response to struggling product X significantly influenced the outcome of the transition from X to Y. With the focused efforts of the operations management team, Intel did its best to satisfy customers through the transition. However, customers were frustrated by supply shortages, and the costs associated with the transition were significant. Product Y was introduced at a deep discount, the investment in the marketing campaign had been substantial, and operations had to make significant investments in capital equipment to meet customer demand. An operations manager recalled the experience with a touch of sarcasm: "I lived through a lot of fun for a year and a half."

It should come as no surprise that the problems described above occur during product transitions. If the success of a single product is highly uncertain, posing a major challenge to companies, the interplay between consecutive generations only increases the complexity and the impact of managerial decisions. Despite demand and supply uncertainties[4] and the complex interplay between consecutive generations, companies must still manage transitions appropriately to sustain their competitive advantage. Our field studies at Intel show that while numerous factors affect the rate and success of product transitions, *imperfect information sharing and coordination* among groups is one of the more important challenges to successful transitions[5], as it can prevent managers from adequately assessing the state of the transition and impair the effective design and implementation of contingency planning (i.e., well-planned prevention

and mitigation policies) in the face of unexpected changes.[6] A senior supply chain manager at Intel commented on the process associated with the marketing campaign for product Y.

> "One of the issues was that we were an afterthought when [marketing] defined what the program was. So, we were not there … in the beginning to understand how much room we had. It was kind of: here's the program, we're going, here's your new demand and then we got tight."

The alignment of actions and decisions across different groups within an organization and among several organizations helps level expectations and synchronize responses across the various functional teams involved in the transition, improving the company's ability to anticipate and react to environmental changes. The ability to adapt rapidly to environmental changes while meeting market objectives constitutes a critical aspect of managing product transitions. As a mechanism to promote the alignment across groups and the development of prevention and mitigation strategies, we developed a formal process to guide decision making during product transitions.

The proposed framework equips managers with the ability to design and implement appropriate policies to ramp up sales for the new product and ramp down sales for the current/old one, balancing supply and demand for both such that combined sales grows smoothly. Hence, the proposed framework entails a *peak-to-peak* sales perspective (Figure 1a), which provides a simple way of categorizing the possible failure modes of product transitions.

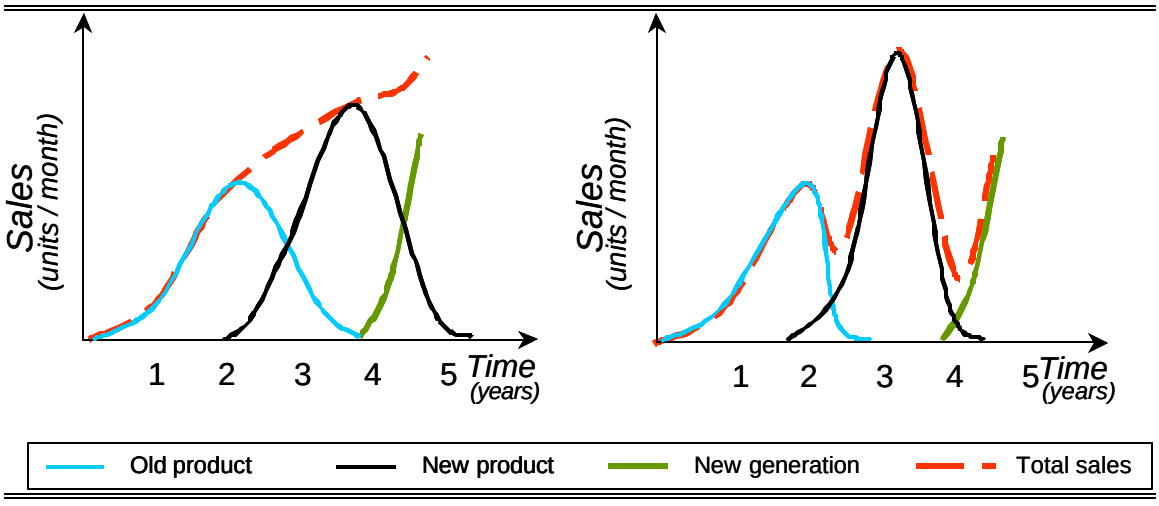

Figure 1: (a) Smooth and (b) Troubled Product Transitions.

While the proposed process does not eliminate the uncertainty inherent in product transitions or completely substitute existing processes, it helps managers gain an overall understanding of the risks and challenges of the transition and offers possible courses of action and their likely impacts. Trial implementations suggest that the process leads to more robust, efficient, and effective product transitions, and due to its potential, is being applied at Intel Corporation in several upcoming new product transitions.

Managing Product Transitions: The Proposed Process

The proposed process (Figure 2) begins with identifying specific **market objectives** (e.g., meeting profit or market share goals, maintaining technology leadership). The next two steps are **product drivers and risks identification** and **factor assessment**, which identify, monitor, and measure a set of factors across departments for each product (old and new) to create an individual assessment of risks. Risk assessment for specific products can then be used to explore possible risks arising from interactions between products using the **transition grid**. The process culminates with the development of a **transition playbook,** which includes primary and contingency strategies with which to manage and mitigate transition risks. Primary strategies implement policies aimed at the success of the transition and specifically at the avoidance of more threatening risks. The evolution of risks in the factor assessment is continually monitored and updated to invoke contingency planning when necessary and develop scenarios of risks and responses. The combination of factor assessment and scenario analysis allows the development and execution of robust prevention and dynamic mitigation strategies for product transitions. As supply and demand dynamics resulting from different strategies evolve or the company plans for new transitions, the process is repeated.

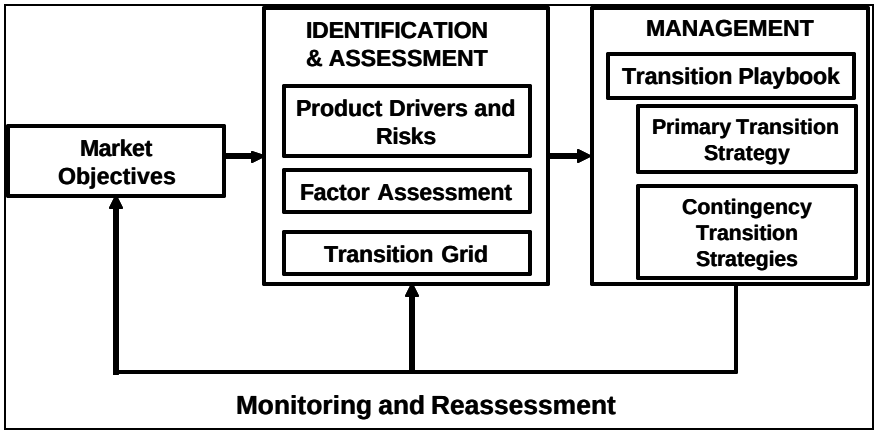

Figure 2: The Process Flow of Transition Mapping

Product Drivers and Risks: Why is managing transitions so difficult?

Our investigation of multiple generations of products at Intel suggested numerous factors that affect the adoption rate and success of a new product. We can group the factors in two general categories of risks and drivers: demand (market) and supply (frequently technology in the business we studied). While an utter failure can result from either a demand or a supply risk, a successful product introduction must go smoothly in both of these areas, adequately balancing demand and supply. Supply-demand imbalances can cause the adoption of a new product to evolve differently than planned, affecting its likelihood of success. Demand risks reflect the uncertainties associated with the market's perception of a new product and can be affected by product attributes and transition policies. Supply risks result from the challenge facing the company and its supply chain partners to utilize new manufacturing processes or product designs, or to ramp up the new product. Across demand and supply risks we find that eight factors influence the success of product transitions (Table 1):

Table 1: Product Drivers and Risk Factors

Risks	Factors	Definition (Example)
Demand (Market) Risks	Environmental Indicators	Demand due to macroeconomic and business forces/cycles (Overall business climate)
	Competition	Overall threat posed by competitive products (Market share, manufacturing capacity)
	Product/Platform Pricing	Product/platform price relative to alternative products (Bill-of-material cost, expected price changes)
	Timing	Timing relative to past, present, and future alternative products (Time since last introduction, time until next introduction)
	Marketing Indicators/Policies	Positioning and measures of market response (Budget size, breadth and timing of advertising, promotions)
	Product Capability	Product capability relative to alternative product (Performance, quality, longevity, reliability, compatibility with previous generations, and complementarity with other products)
Supply (Technology) Risks	External Alignment and Execution	Acceptance and drive from supply chain partners (Partners' ability to manufacture products using state-of-the-art technology and standards, and acceptance of the new product within the product platform)
	Internal Execution	Ability to supply the product in volume (Execution of internal design, designing products for manufacturability, manufacturing (or testing) capacity and flexibility, and distribution)

These factors encompass all possible risks affecting the adoption rate of a new product related to *product features* (product capability), *process features* (internal execution), *supply chain features* (external alignment and execution), *managerial policies* (pricing, timing, marketing), and *externalities* (environmental indicators, competition).

While it is possible for an organization to have access to information on all product drivers and risk factors, it is unlikely that any single functional group possesses all the pieces together to understand the overall forces facing the introduction. The process we propose for transition management begins with a method for developing a cross-organizational transition assessment. This structured and repeatable

process benchmarks new products against current and prior generations so that a new product's prospects for success and potential rate of sales may be framed using historical products.

Factor Assessment: How is the product doing?

The *factor assessment* (FactA) provides a subjective assessment and overview of risks impacting a product. It highlights different areas facing challenges and allows decision making based on specific information. To assess the actual values of factors in Table 1, we interview key players in various functional groups (such as marketing, sales, planning, and forecasting) responsible for managing a new product. Each group scores all eight factors according to their vantage point using a scale with values ranging from 1 (very favorable) to 5 (very unfavorable). Scoring is assessed using past products as a baseline, helping to drive objective assessment of the new product. Since different functional groups typically have privileged understanding and information about specific areas, each group provides specific comments about each factor and provides reasons motivating their scores. Consolidating all the information provides all groups with an overall understanding of each group's perspective and assessment of the overall risks for a product. Making the comments from different functional groups available provides a broader and shared perspective to all groups. After meeting with all cross-sections of groups involved in managing the product, a cross-functional group responsible for managing the product determines a composite score for each factor, providing a simple metric to quickly assess the state of a product. To gain a visual representation of risk areas and their relative impact on the adoption rate of a product, we use a spatial display with eight axes (each corresponding to a factor) and a scale measuring risks (large values indicate high risk along the dimension.)[7]

Table 2 details the application of factor assessment to products X and Y.

Table 2: FactA Results for Products X and Y

Factor	Product X	Product Y
Environmental Indicators	Demand and economy relatively slow; no imminent improvement on horizon	
Competition	Competing products are better aligned to mainstream market	Competitors' sales strong relative to historical levels but limited by manufacturing capacity
Product/ Platform Pricing	Platform cost significantly higher than prior generation	Reduction in overall platform cost and marketing decision to cut prices
Timing	Released less than one year after prior generation; Y known to be only a few quarters away	Release closely follows X; Y will not be replaced in the near term
Marketing Indicators	Positioned toward higher end of market with higher price and performance	Price reduction brings product back to mainstream market segments
Product Capability	Faster clock speed than prior generation, but benchmarks show only modest performance gains in many applications	Potential clock speed is high, but overall speed gains are impaired by localized bottlenecks
External Alignment and Execution	Strong resistance to adopting some new technologies in the platform; higher materials cost; platform architecture will change with Y	New architecture and accompanying platform materials cost reduction bring record number of design wins; price cuts enable greater performance at lower price points
Internal Execution/Risk	Supply positioned for moderately paced ramp	Decreased supply capability due to less efficient production and lower yields associated with roadmap acceleration

Figure 3 depicts the results of our qualitative coding for each factor affecting X and Y calculated shortly after product Y was introduced. The factor assessment suggests that X has significant demand risk due to high pricing, poor external alignment and execution, and low capability, all exacerbated by a fairly weak business economy. Supply risks for X are not significant. In contrast, Y benefits from lower prices, reduced platform cost, stronger external alignment and execution, and better value proposition. Despite the weak economy, product Y's favorable factors suggest strong demand for Y and low demand risk. Internal execution indicates tightening supply (higher risk) during the transition to product Y.

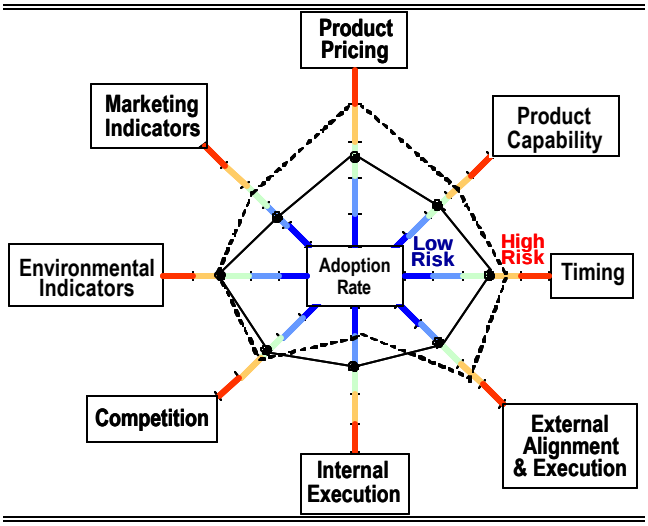

Figure 3: Visual Representation of the FactA Display for Products X (dashed) and Y (solid). **Note:** The spatial display emphasizes high risks as salient areas sticking out for improvement; therefore, high values are represented away from the origin.

Since continual managerial and environmental changes impact product sales over time, updating the factor assessment frequently allows managers to quickly identify risky areas as well as the results of previously implemented strategies by inspecting the evolution of the FactA contour. Our experience suggests that there is a fine balance between the frequency of updates and the effectiveness of the strategies chosen based on the new information. Very frequent updates have shown diminishing returns since changes over the course of short time periods tend to be limited. Frequent updates may also introduce nervousness to the transitions. The exact frequency of the updates depends on the industry and the life expectancy of the products. For the high-tech industry we recommend monthly updates. Even an ad hoc approach to updating works well: an overall update is completed anytime a significant change occurs in one of the factors (e.g., competitors introduce a marketing campaign, lower their prices, etc.). The key is that managers should balance the availability of new information and the delay before previous decisions have a measurable impact.

Effective planning depends of good insight across the organization. If the best information is distributed and fragmented among many groups, compartmentalized – sometimes redundant or conflicting – decisions will result. Factor assessment is a collaborative process designed to aggregate information and develop a composite view of drivers and risks from across all organizational perspectives, helping managers improve the chances that strategies and tactics will be synchronized across the organization and aligned to true demand and supply forces.

Transition Grid: How do products interact?

To assess the overall risks facing a transition, we must consider the interplay between products. A simple method to evaluate the interactions between the products is to evaluate the interactions between demand and supply risks for the two products. Using the composite FactA values for each product we can assess an overall demand and supply risk for each product. We do this by assigning weights to each factor and taking a weighted average of demand (supply) risk factors to come up with a demand (supply) risk score. Each product's scores for supply and demand risks can then be compared to threshold values

to distinguish between low and high risks. As a result, each product can be categorized into high or low demand and supply risks.

Figure 4 ranks each of the sixteen possible combinations of supply and demand risks for the two products, provides comments for each transition scenario, and assesses the overall transition risk. The ranking assumes that risks for the new product have a stronger impact on profitability and that the company has lower ability to manage demand risks. Therefore, demand risks and new product risks receive higher scores than supply risks and old product risks, respectively. Comments provide managers in the transition team with answers to questions such as: Are we producing the right products? Can we meet customer demand? Do customers want the products that we supply? A row in the table provides managers with a snapshot assessment of the transition. For example, if the current product has high demand/low supply risks and the new product has low demand/high supply risks, the transition will fall into an overall risk category of 4.

Rank	Old Product		New Product		Comment	Risk
	Demand Risk	Supply Risk	Demand Risk	Supply Risk		
1	Low	Low	Low	Low	Most desirable situation	1
2	High	Low	Low	Low	Customers do not want old product (indifferent to line below)	1
3	Low	High	Low	Low	Limited availability of old product (indifferent to line above)	1
4	High	High	Low	Low	Fast transition is desirable for customer and producer	2
5	Low	Low	Low	High	Common situation of new product supply ramping to meet demand	2
6	Low	Low	High	Low	Lack of demand for new product can stall transition	3
7	Low	Low	High	High	Transition is stuck on old product	3
8	High	Low	Low	High	Customers want new product, but only old is in good supply	4
9	Low	High	Low	High	Challenging to supply either product to meet demand	4
10	High	Low	High	Low	Customers do not want either product, but both can be produced	5
11	Low	High	High	Low	Customers want old product, but only new is available	5
12	High	High	Low	High	Customers want new product, but it is challenging to supply it	5
13	Low	High	High	High	Customers want old product, but it is challenging to supply either	5
14	High	High	High	Low	Can supply only new product that customers do not want	5
15	High	Low	High	High	Can supply only old product that customers do not want	5
16	High	High	High	High	Customers do not want either product; challenging to supply either	5

Figure 4: A Sample Transition Grid: Demand and Supply Risks of Two Products

Positioning a transition within the grid helps transition teams look beyond one product and evaluate the potential impact products may have on each other. Even when only one of the products is prone to supply or demand risks, a good managerial policy is to consider potential demand cannibalization or spillover effects on the other product as well as the potential supply imbalances that may be caused by cross-product effects. When both products have demand or supply risks, the product interactions may further intensify the risks and should be monitored very closely. For instance, rows 9,

12, 13, and 16 show high supply risk for both generations of product, indicating that the company may not be able to sell any product at a point in time, or at least may face severe shortages. Rows 10, 14, 15, and 16 indicate demand risk is high for both generations, suggesting that inventory risk is a serious threat. As a final example, rows 8 and 11 indicate the company is better able to supply the generation of product that customers do not prefer.

To evaluate the XY transition, consider first the factor assessment for products X and Y independently. X has significant demand risk due to its high price, poor external alignment, and only moderately improved capability. Y faces little demand risk due to low platform cost while performing similarly to X; however, reduced capacity poses some supply risk. The combination of high demand risk for X and high supply risk for Y places the transition in line 8 of the grid with an overall transition risk category of 4, suggesting a glut of X accompanying shortages of Y. While Y has many attributes of a successful product, the decision to offer Y at discount (a policy developed in response to low sales of X) exacerbates the supply risk and more firmly places the transition in the line 8 scenario.

The combined use of FactA and transition grid provides a strategic and tactical assessment of the transition. Still, they do not provide specific strategies or fallback alternatives when the original plan does not materialize. Therefore, the process must also consider possible strategies that coordinate managers' responses to the transition risks.

Transition Playbook: What to do?

Companies that address risk systematically often rely on contingency plans as a means to respond to unexpected events. That is, companies are often skilled at reacting to uncertainty *a posteriori* while failing to address problems *a priori*.[8] In the context of new product transitions, companies often resort to contingency strategies to rescue a product after it is launched. However, their ability to rescue a product using contingency strategies is limited. By assessing the state of a transition early on, companies gain an overall understanding of the risks impacting the transition and factors requiring immediate attention, allowing them to adopt prevention instead of contingency strategies. Moreover, frequent updates provide

a systematic assessment of a transition over time, focusing managerial attention on early detection and preventive planning.

Managers should develop prevention strategies in response to the more significant risks identified as jeopardizing the transition. Prevention strategies require companies to utilize levers that can affect the factors in a desired way. Levers may impact many high-risk factors at once, allowing prevention strategies to be global and longer-term (i.e., they target the product roadmaps), or they may be targeted toward specific factors hindering supply or demand of the transition at hand. Still another important aspect of prevention strategies is their effectiveness. Managers should consider cost as well as ease of implementation due to reasons such as company culture, previous commitment to a course of action, and limited resource availability. Most importantly, companies should recognize which levers are available and which they control. Companies usually have little control over the environment and competition: only select companies can influence the economy or the business climate in their own sector even indirectly, but many companies do have indirect control over competition through their own product, marketing, and pricing strategies or through their efforts to define or influence product and technology standards. On the other hand, companies have some control over marketing indicators and external alignment and execution, even if the effects can only be realized in the long term. Factors with greater control are pricing, timing, product capability, and internal execution. Companies can use these factors even in the short run in order to steer the direction of the product transitions. Finally, it is important to keep in mind the potential unintended consequences of the prevention strategies. Managerial policies are usually followed by competitors, leading to stiffer competition among products. Because new products eventually become old, changes in pricing, timing, marketing, and performance to today's new product, impact roadmaps and make it harder for tomorrow's new product to substitute it.

Considering these dimensions before adopting different measures provides a venue for addressing the strategies truly available to deal with vulnerabilities of a transition. While a well-designed strategy may cover several factors, companies are generally subject to the factors with the least control and use the factors with the greatest control as levers within transition strategies. For instance, an economic

downturn might lead to a price move. There may be several different ways to mitigate a risk, say, a supply problem caused by internal execution. One possibility might be to reduce product orders via price manipulation. By increasing prices, the company slows down product sales, reducing the likelihood of stockouts, hence improving the alignment of short-term supply and demand. While such a pricing strategy can be very effective and the company has complete control over it, the longer term costs should be weighed. Demand may shift to future sales as supply improves; however, it may also shift to purchases of competing products. An alternative to curbing demand is increasing supply, perhaps outsourcing capacity to mitigate this internal execution problem. However, outsourcing may not always be a feasible alternative: the company may be limited in several ways, by contractual agreements that impact cost and available outsourced capacity, and fear of sharing proprietary research and development. In addition, the strategy may require considerable amount of time before it becomes available and may have limited flexibility in terms of production volume. To be able to use outsourcing as a feasible contingency strategy when need arises, the company may need to invest in a prevention strategy, i.e., create supply portfolios, ahead of time.

After the transition risk assessment (FactA and grid) is complete, managers understand which areas require most attention, infer the impact on the old product, and generate a list of potential outcomes. Consideration of the types of control in the transition playbook provides a guide for both prevention and contingency strategies. The playbook allows managers to consider the pros and cons of different strategies and to select them accordingly, thereby adequately managing the transition with both robust and dynamic strategies. It identifies events or scenarios leading to major risks, determines the impact these events may have on the new and current products, and specifies prevention and contingency strategies for the transition team. A sample playbook is displayed in Table 3.

Table 3: Transition Playbook Sample. The entries in italics represent the playbook for XY transition.

Events/ Scenarios	Impact on Old Product	Expected Outcome	Prevention Strategies	Contingency Strategies
DEMAND for new product higher than expected	• *Demand cannibalization*	• *Supply shortage for new product* • *Excess supply for old product*	• Supply portfolio • *Product pricing* • *Internal execution*	• Gradually phase-out old product • Outsource old product • *Decrease old product price* • *Increase new product price* • *Allocate more capacity to new product*
SUPPLY problems for new product	• Demand spillover	• Excess demand and hence possible supply shortage for old product • Supply shortage for new product	• Product design • Internal execution (process yield) • Product pricing	• Gradually phase-out old product • Outsource old or new product • Decrease old product price • Increase new product price • Allocate more capacity to new product
DEMAND for new product lower than expected	• Demand spillover	• Supply shortage for old product • Excess supply for new product	• Product characteristics • External alignment and execution	• Gradually phase-out old product • Increase old product price • Increase production of old product • Accelerate roadmap • Decrease new product price (rebates/promos) • Heavy marketing of new product • Work on external alignment and execution

Even a well-planned and well-executed product transition may require strategy updates. By mapping out primary strategies, risks, and contingent strategies in advance, the transition playbook provides ways to minimize risks. Once a playbook is prepared, companies can monitor key supply and demand risk indicators to capture signals for strategy revisions and invoke contingent strategies as needed.

Consider the playbook application to the XY transition. Since Y's supply risks resulted from higher than expected demand and since X faces high demand risk, the likely impact is sales cannibalization of X (Table 3). Intel should have expected shortages of Y and excess inventory of X. In fact, this is what happened. A prevention strategy to address the high supply risk for Y would have introduced Y with a higher price instead of offering it at a discount.

Potential contingent strategies could have included lowering X's price to promote its sales and allocating more manufacturing capacity to Y to improve its supply. Such actions would have rebalanced demand between X and Y in the short- and long-term, respectively.

While the initiatives of price discounting and a marketing campaign would have been sound for X, applying them to Y as well– which already exhibited lower demand risk and higher supply risk compared to X – caused demand to outstrip supply.

Business Impact

We tested the transition mapping process, particularly the FactA process, using a large-scale product transition at Intel. The market objectives for the new product were defined as achieving a target number of unit sales in the first two quarters after launch at a price point comparable to the prior generation. Based on FactA, the relative strengths for this transition included healthy economic and marketing indicators, and supply capabilities ready to handle a moderately strong ramp, albeit with some risk early in the product lifecycle due to the new technologies involved. Areas of concern centered on the cost and complexity of the new platform, which affect the pricing and external alignment factors.

Using the transition grid, we observed that the transition held fairly low risk for old product demand and supply and moderate risk for new product demand and supply. New product demand and supply risks were elevated not because of the merits of the product – on the whole, the industry seemed well aligned to the architectural improvements offered in the new platform – but rather because of its complexity (supply risk) and the increased cost associated with new standards and components (demand risk). It therefore fell among lines 5, 6, and 7 in the transition grid shown in Figure 4. If demand and supply risk materialized (line 7), sales of the old product would continue to be high, while alignment of supply and demand would be fairly good. However, the new product would stall. If either supply or demand risk were high (line 5 or 6), but not both, then an imbalance would cause either a sales shortfall or excess inventory.

The central business planning group at Intel felt sales of the new product would come in fairly strong. Defining x as the realistic "whisper" estimate among forecastors, a figure of roughly 1.2x was being circulated to drive supply. Meanwhile, estimates aggregated from the geographical sales organizations suggested lower sales, ranging over time from 0.65x to 0.9x. Based on the results of the FactA and historical sales in the same product family, the transition mapping team published an analysis

concluding that sales were unlikely to exceed 0.93x and would likely come in lower. The drivers for this recommendation included solid evidence that component cost would somewhat curb demand early in the transition and that the complexity of the new platform posed significant supply risk. If only one component of the new platform were slow to market, the entire transition would push out by weeks or perhaps months.

Concerns about demand led to the development of more aggressive marketing investments, encouraging pivotal customers to become "rabbits" for the new product. While many customers were willing to commit to the product for the performance end of the product stack, component costs could slow adoption toward the value end of the stack for the first six months. As a result, sales of the prior generation product were expected to exceed expectations for two to three quarters after new product shipments began.

As the product launch unfolded, a key component of the platform stack was late to market by over four weeks. While this delayed the transition start, it provided time for other components to be produced in greater quantities, isolating supply shortages to the late part. Demand initially came in softer than the whisper estimate, so supply and demand aligned quite well for the new product, each reflecting a result a bit worse than the ideal scenario. This situation corresponds to line 7 of the transition grid. Sales forecasts were revised downward through the launch window from 1.2x down to about 0.9x six weeks after launch and continued to decline a bit further. By the beginning of the second quarter after launch, the forecast was accurately calling 0.79x for the first two quarters' total sales. The transition mapping process had successfully led a reduction in the sales forecasts, which helped avoid overbuilding supply for the new product while maintaining sufficient stocks of the old product. The process also supported the increased marketing budget, which helped drive product sales early in the lifecycle.

During this first implementation of the process a playbook was developed and maintained in parallel to Intel's standard product management processes. The recommendation to stimulate demand through marketing techniques was generated by both processes, but the playbook alone did not drive this decision. Taking the step to integrate the playbook as a core management method is a significant one, and

companies should rightly base such a decision on a proven track record that can be developed by running in parallel.

Implementation Recommendations

The transition mapping process provides a structured approach to collecting information and coordinating actions across the organization. One of the benefits of the structured approach is that it reveals key differences in perspectives from across different functional groups, facilitating communication and deliberations. As such, it avoids some of the second-guessing and possible manipulations by groups when the differences are not brought into the open. In addition, the adoption of the transition map relieves redundant and conflicting policies, providing a coherent and aligned decision making guide for the company.

Evaluating product interactions is central to the success of a transition. While companies place enormous emphasis on the introduction of new products, our studies show that even products with many successful attributes can experience problematic transitions due to unexpected interactions with the existing product. Eliciting the risks associated with such interactions promotes strategic alignment of decisions across products.

A strategy playbook leads to flexible and effective transitions by guiding managers develop robust primary and contingent strategies to deal with the supply and demand risks determined in the transition grid. It also specifies combinations of events that may lead to a possible outcome. As such, a strategy playbook is less costly and more effective than a wait-and-see strategy, especially for products with short life cycles and long production delays.

To increase the chances of a successful transition, companies should map the transition process early on and assess the state of the transition for a new product two or three quarters prior to introduction. Despite some of the uncertainties in this timeframe, early assessment can bring critical issues to the attention of managers at a time when it is still possible to address product or platform design issues, encourage greater external alignment and execution, or adjust production capacity. While marketing

indicators are difficult to judge far in advance, other factors can be estimated with greater confidence even at this early stage. Early factor assessment also allows the company more time to compare the current transition to the profile of previous transitions and to map strategies and tactics based on what has worked well in the past. Since the overall environment is continually changing, it is important to frequently update the transition map.

We have found that the transition mapping is a very general process. While our process was developed and applied to transitions at Intel Corporation, it could be used in a number of different industries and companies. The details of the implementation may change depending on the specific industry, company and product, but the overall process steps would remain unchanged. In particular, a specific industry may place more importance on some factors or even include factors not accounted for here; a specific company may have access to a limited number of primary and contingent strategies; specific products may interact in more complex ways than those exemplified here. Still, the factor assessment provides an effective way to assess the state of a product and share the conclusions across functional groups; the transition grid enables the assessment of these complex interactions and their impact on demand and supply risks; and the strategy playbook allows managers to align preventive and contingent strategies and the corresponding tactics to invoke. Our experience with Intel and discussions with managers from other companies suggest that the proposed process can help companies during transitions. We look forward to the emergence of other approaches and improvements to our process both of which can help companies make better decisions during product transitions.

Summary of the Research Methodology

Our research is based on a three year-long investigation (from 2001 to 2004) at Intel Corporation of the risks and drivers affecting product transitions. Our team conducted about forty semi-structured interviews with managers in diverse areas – such as supply chain management, demand forecasting, sales, marketing, and product development – through full time employment, a summer internship, several site visits and frequent conference calls. After studying multiple historical and then current product transitions at Intel, we learned that a perfect transition is difficult to achieve. The complexity of demand and supply dynamics causes tremendous uncertainty in advance of a product launch that does not fully resolve until quarters after launch. We observed that functional teams across the organization had access to information – ranging from macroeconomics conditions in Asia to the availability of a two-dollar part – that factor into the relative demand and supply of old and new products. Since the lack of a formal mechanism to aggregate and utilize such diverse information caused some degree of misalignment in the transitions we studied, we developed a new process to overcome this obstacle. The proposed process first identifies a specific market objective. The next two steps identify and measure a set of factors across departments for each product (old and new) to create an individual assessment of product drivers and risks. Then, we explore possible risks arising from interactions between products using the transition grid. The process culminates with the development of a transition playbook, including primary and contingency strategies with which to manage and mitigate transition risks. Primary strategies implement policies aimed at the success of the transition and specifically at the avoidance of more threatening risks. The evolution of risks in the factor assessment is continually monitored and updated to invoke contingency planning when necessary and develop scenarios of risks and responses. We have found that the proposed transition process helps level expectations across the organization, improves forecasting, lessens the chance of surprise, and helps synchronize responses among different teams, leading to more robust, efficient, and effective product transitions.

[1] See for example G.S. Lynn and R.R. Reilly, "Blockbusters: The Five Keys to Developing Great New Products," HarperBusiness (October 01, 2002); E.E. Bobrow and D.W. Shafer, "Pioneering New Products: A Market Survival Guide" (Dow Jones-Irwin: New York, 1987); and M.R. McMath and T. Forbes, "What Were They Thinking?," (Times Business-Random House, New York, 1998).

[2] See for example R. Cooper, "How New Product Strategies Impact on Performance," Journal of Product Innovation Management, 1 (1999):5-18.

[3] See for example N. Repenning "Understanding Fire Fighting in New Product Development," Journal of Product Innovation Management, 18/5 (2001): 285-300. See also C. Billington, H.L. Lee, and C.S. Tang, (BLT hereafter) "Successful Strategies for Product Rollovers," Sloan Management Review, 39 (Spring 1998): 3, 23-30.

[4] K. O'Marah, "Plugging the Leaky R&D Pipeline," Ascet, 6 (June 15, 2004).

[5] BLT corroborate this finding and present a high-level process for managing new product transitions. They recommend dual-product rollovers (i.e., introducing the new product before the end-of-life of the old one) for transitions with high demand and supply risks and solo-product rolls (i.e., the new product introduction concurs with the old product end-of-life) for low demand- and supply-risk environments. Oftentimes, however, the industry dictates the choice of solo- versus dual-roll available to companies. Dual-product roll is standard in the high-tech industry, where product platforms are common, even for products with low demand and supply risks. Further, the process proposed by BLT does not provide much insight into tactical and operational decisions regarding pricing, capability, marketing budgets or product deployment, all of which can have a substantial impact in the success of a transition.

[6] We characterize prevention strategies as those undertaken to stop or reduce the possibility of transition glitches occurring and mitigation strategies as those undertaken to stop or reduce the consequences when a transition glitch occurs. While contingent strategies tend to be mitigative, primary strategies are as likely mitigative as preventive. Nonetheless, we use the terms "primary" and "prevention" interchangeably, thereby abusing the terminology.

[7] We adapt the visual representation from the multidimensional scaling work of R. Quinn and J. Rohrbaugh, "A Spatial Model of Effectiveness Criteria: Towards a Competing Values Approach to Organizational Analysis," Management Science, 29 (1983): 363-377.

[8] For example, refer to H.L. Lee and C. Billington, "Managing Supply Chain Inventory: Pitfalls and Opportunities," Sloan Management Review (Spring 1992): 65-73 or G.A. Zsidisin, A. Panelli, and R. Upton, "Purchasing Organization Involvement in Risk Assessments, Contingency Plans, and Risk Management: An Exploratory Study," Supply Chain Management: An International Journal, 5 (2000): 4, 187-197.